

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (currently amended) A real-time monitoring apparatus for biochemical reaction, comprising:

~~a temperature control block comprising a thermoelectric element capable of supplying heat into reaction tubes;~~

~~and a heat transmission block which transmits the heat to the reaction tubes;~~

~~a light irradiation source comprising:~~

a tube plate capable of holding a sample;

a lamp for irradiating to a sample contained in at least one of the reaction tubes in the tube plate [.,.];

at least one reflective mirror [.,.];

an optical waveguide positioned in front of the lamp which has an open structure in cooperation with said reflective mirror, said optical waveguide having a configuration that alters a light path passing through at least one end of the optical waveguide and provides a uniform intensity of light [.,.];

an infra-red cutting filter filtering light transmitted through a light path that comprises said infra-red cutting filter, said reflective mirror and the optical waveguide and said infra-red cutting filter cutting infra-red from the lamp and a selective transmission filter for transmitting light selectively to monitor a reaction progress [.,.];

said light transmitted through a light path illuminating the sample with a uniform light intensity distribution as provided by the uniform intensity of light from the optical waveguide, the optical waveguide reducing of the difference in light intensity between the center and the edges ~~of a~~ of the tube plate;

a condensing lens positioned outside of a portion of a light path comprising said reflective mirror, the optical waveguide and the infra-red cutting filter;

an optical system comprising a receiving part for receiving fluorescence transmitted through a second focusing lens, using a light receiving element capable of receiving the fluorescence, the fluorescence irradiated from the sample by light emitted from a light irradiation source as transmitted through a light path comprising the optical waveguide, the selective transmission filter and a first focusing lens; and

said components arranged so that light will travel through optical components of the real time monitoring apparatus in the order of the lamp, the infra-red cutting filter, the optical waveguide, the selective transmission filter, the first focusing lens through the sample and the light receiving element.

2. (currently amended) The real-time monitoring apparatus according to claim 1, wherein the lamp includes an ellipsoidal reflecting mirror or a parabolic mirror.

3. (original) The real-time monitoring apparatus according to claim 1, wherein the refractive index of medium of the optical waveguide is 1.35~2.0.

4. (currently amended) The real-time monitoring apparatus according to claim 1, wherein:

the reaction tube plate has a rectangular layout; and

the optical waveguide has a rectangular shape, thereby minimizing the loss of the light emitted from the light irradiation source by irradiating the light transmitted through the light path in a rectangular light beam adjusted to an aspect ratio of the reaction tube plate using the optical waveguide.

5. (previously presented) The real-time monitoring apparatus according to claim 1, wherein the cross-section of the optical waveguide has a round shape.

6-11. (canceled)

12. (previously presented) The real-time monitoring apparatus according to claim 1, further comprising two or more reflective mirrors positioned to alter light path after transmission from the light irradiation source.

13-16. (canceled)

17. (previously presented) The real-time monitoring apparatus according to claim 2, wherein the lamp including a parabolic mirror further comprises the first focusing lens.

18. (canceled).

19. (new) A real-time monitoring apparatus for biochemical reaction, comprising:
a thermoelectric element capable of supplying heat into reaction tubes;
a heat transmission block which transmits the heat to the reaction tubes;
a tube plate capable of holding a sample;
a lamp for irradiating to a sample contained in at least one of the reaction tubes in the tube plate;
at least one reflective mirror;
an optical waveguide positioned in front of the lamp which has an open structure in cooperation with said reflective mirror, said optical waveguide having a configuration that alters a light path passing through at least one end of the optical waveguide and provides a uniform intensity of light;

an infra-red cutting filter filtering light transmitted through a light path that comprises said infra-red cutting filter, said reflective mirror and the optical waveguide and said infra-red cutting filter cutting infra-red from the lamp and a selective transmission filter for transmitting light selectively to monitor a reaction progress;

said light transmitted through a light path illuminating the sample with a uniform light intensity distribution as provided by the uniform intensity of light from the optical waveguide, the optical waveguide reducing of the difference in light intensity between the center and the edges of the tube plate;

a condensing lens positioned outside of a portion of a light path comprising said reflective mirror, the optical waveguide and the infra-red cutting filter;

an optical system comprising a receiving part for receiving fluorescence transmitted through a second focusing lens, using a light receiving element capable of receiving the fluorescence, the fluorescence irradiated from the sample by light emitted from a light irradiation source as transmitted through a light path comprising the optical waveguide, the selective transmission filter and a first focusing lens; and

said components arranged so that light will travel through optical components of the real time monitoring apparatus in the order of the lamp, the infra-red cutting filter, the selective transmission filter, the optical waveguide, the first focusing lens through the sample and the light receiving element.